We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

4,800
Open access books available

122,000
International authors and editors

135M
Downloads

Our authors are among the

154
Countries delivered to

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities

CLARIVATE ANALYTICS BOOK CITATION INDEX INDEXED

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

Chapter 18

Evaluating the Geography and the Visibility Tendencies of Acupuncture Treatment Locations in Metropolitan Toronto

Stephen P. Meyer

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/54599

1. Introduction

Acupuncture treatment can be delivered from the offices of health care professionals. Acupuncture is most commonly practiced by individuals working within the complementary and alternative medicine (CAM) sector; such as those self-identifying as 'primary' acupuncture practitioners, and chiropractors, massage therapists and naturopaths will often administer acupuncture treatment as part of their holistic approach to medicine. On the conventional medicine (CM) side, some dentists use acupuncture to help patients deal with anxiety [1], pain [2] and to control the gag reflux through 'hypnopuncture' [3] and 'integrative' family doctors and physiotherapists may suggest or administer acupuncture treatment for chronic pain issues [4].

Generally speaking, health care professionals and medical facilities are not located equally over geographic area. The spatial disparities in health care accessibility that these supply configurations create for citizens within various jurisdictions continues to be an important concern of medical geographers, policymakers and the like. Researchers examining the geography of health care supply in countries such as Canada have, more often than not, assessed the CM sector with analysis on the distribution of, and accessibility patterns to, family doctors, specialists and/or hospitals [5-13]. Analysis on the spatial properties of CAM is emerging at a more modest rate (for reviews of the literature see [14-18]) and there are examples of empirical geographic research on specific CAM health care such as chiropractors and naturopaths [19-26]. Although acupuncture research continues to expand within a number of fields [27], there is need for geographic study [28] which, aside from contributions from Meyer [18,29], remains underdeveloped.

In Canada, many practitioners that administer health services are small business owners functioning in competitive markets. This is certainly true of CAM operators (such as acupuncture practitioners, chiropractors and naturopaths), but also dentists. The economic success of a small health care establishment is undoubtedly dependent on favorable patient outcomes, but profitability may also be a function of visibility as most consumer services need to be 'seen' to be accessible to new patrons. Indeed, visibility has strong geographic connotations. "What we see is that which lies within our field of vision, where the boundaries of this field are shaped by the spatial and temporal properties of the here and now" [30]. A business's ability to be 'within our field of vision' may be enhanced in a number of ways; such as by being strategically situated in a high traffic/high volume location or by placing advertisements in various media. Visibility requirements will vary with the operator; a well-respected health care provider may, with time, rely less on being visible and more on an excellent reputation. Nevertheless, understanding where health care providers are located, in light of visibility characteristics, is the first step in appreciating the magnitude of these possible advantages. As such, this study focuses on the specific case of acupuncture services in the Toronto census metropolitan area (CMA), located within the Canadian province of Ontario.

2. Methodology

Four types of health care providers that offer acupuncture services are considered: primary acupuncture practitioners, chiropractors, naturopaths and dentists. Primary acupuncture offices represent locations where acupuncture treatments are definitely offered; whereas chiropractor and naturopath offices are locations with likely acupuncture services and dentist offices are locations with possible acupuncture options. Therefore, a number of 2012 datasets, purchased from InfoCanada [31], were utilized for the Toronto metropolitan area:

1. The locations, characteristics (sales, employment and the like) and advertising habits (such as yellow pages, website ads and overall advertising expenditure) of 306 offices for which acupuncture is the primary medical service;
2. The locations, characteristics and advertising habits of 848 chiropractic and 149 naturopathic proprietors (for a total of 997); and
3. The locations, characteristics and advertising habits of 2,942 dentist offices.

All of these offices were placed on a road network layer [32] using the ArcGIS (version 10.0) 'address locator' geocoding function. Within the geographic information system (GIS) environment, these points were compared with respect to visibility advantages. More specifically, each office point was evaluated in terms of being within or beyond 'high visibility areas' and if each office participated in a high or low 'visibility approach'.

High visibility areas are comprised of two components: high visibility polygons and high visibility arcs (lines). By extracting blocks from an Ontario land use map [33], a layer of high

http://dx.doi.org/10.5772/54599

visibility polygons was created by isolating commercial land use blocks and blocks adjacent to commercial areas. In a similar fashion, highways and major roads were taken from an Ontario road network layer [32] and saved as a specific high visibility arc (road) layer. Logically, offices in and around commercial zones and/or on well-travelled streets will feature high traffic volume and thus are high visibility areas. Conversely, low visibility areas are those that are not near commercial zones and not along a major road or highway. Acupuncture, chiropractor/naturopath and dentist office points were, hence, denoted as being located in high or low visibility areas. A high visibility approach was defined in this study as an office that utilizes a display ad in the yellow pages and/or has an above average advertising to sales ratio. A low visibility approach means the office does not have a listing in the yellow pages or only a regular listing (no display ad) and an advertising to sales ratio that is below average (as measured for all offices within the given category in metropolitan Toronto). Therefore, the three health care categories were further stratified by visibility approach (high or low). Online advertising was not specifically integrated into the visibility approach measure due to so few practitioners with a website listing in this database, but general observations are made nevertheless.

Based on these visibility 'area' and 'approach' stipulations, a series of layers/maps were derived in the GIS environment and important geographic patterns concerning the visibility tendencies of those offering, or potentially offering, acupuncture services were realized. Essentially, points were allocated into four groups: 1) high visibility area with a high visibility approach, 2) high visibility area with a low visibility approach, 3) low visibility area with a high visibility approach and 4) low visibility area with a low visibility approach.

The point distributions of these four visibility categories, for each of the three health care categories, were analyzed further to understand within metropolitan Toronto patterns. Specifically, a nearest neighbor analysis of the point patterns was employed using the application within ArcGIS. The nearest neighbor significance test indicates if an observed pattern of points deviates from a theoretical (random) distribution sufficiently enough to be considered significantly clustered or dispersed in space [34]. A nearest neighbor ratio (or index) is derived and this allows for point distributions, within the same sample area, to be compared directly in terms of the degree of clustering and/or dispersion. The ratio/index values were calculated using the Manhattan city block method (right angle distance computations) with the actual metropolitan Toronto area (5,905.71 kilometers square). The nearest neighbor analysis provided more elucidation into the visibility tendencies of the health care providers and corroborated the patterns displayed in the maps. Also, to more precisely assess municipality differences within metropolitan Toronto, a census subdivision (CSD) layer [35] and Census of Canada 2011 population and population change variables were used [36]. See Figure 1 for the location of each municipality.

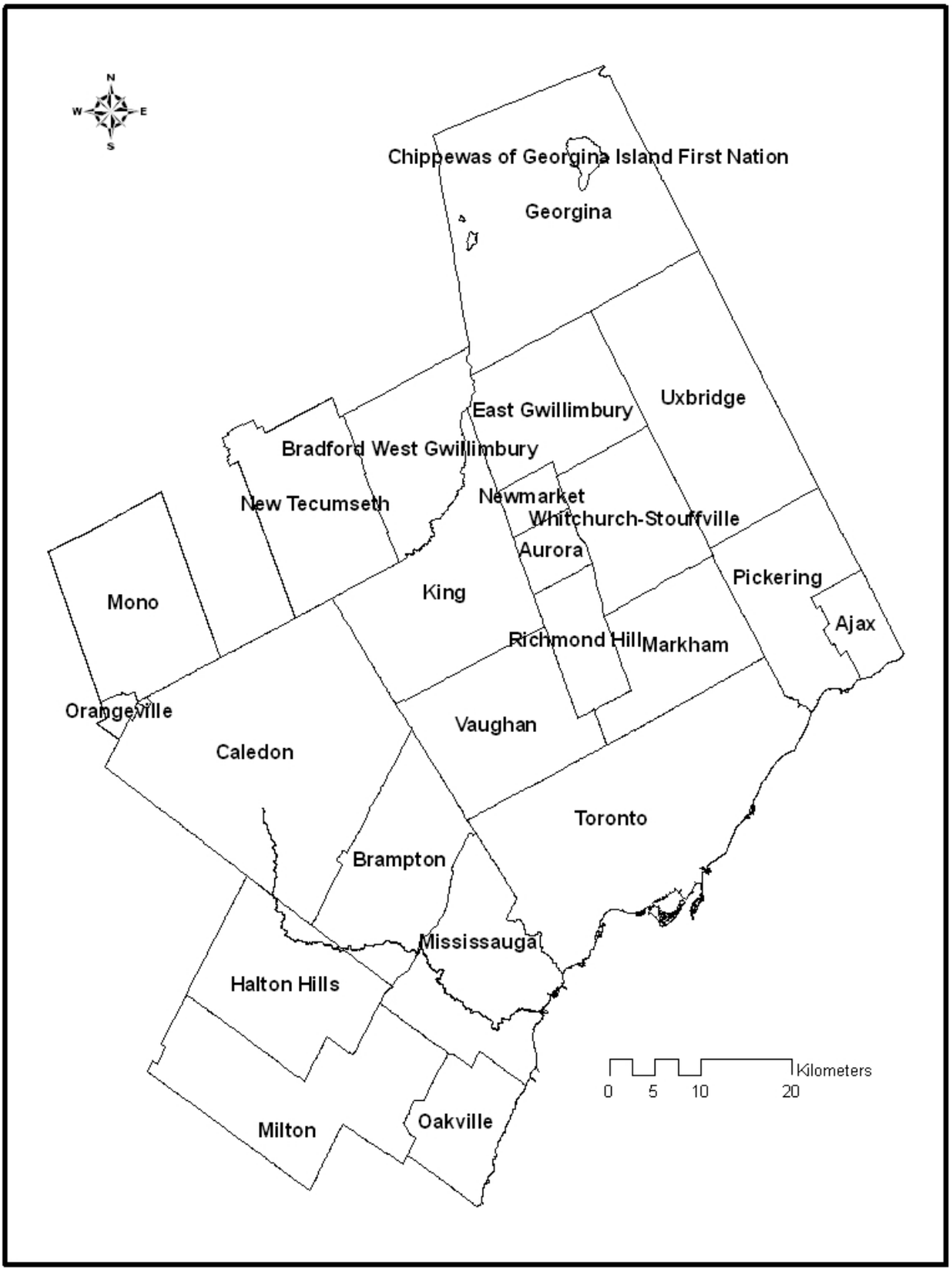

Figure 1. Municipalities in metropolitan Toronto

http://dx.doi.org/10.5772/54599

3. Observing the overall trends

Primary acupuncture, chiropractor/naturopath and dentist office enumerations follow general population trends with disproportionate tallies in the most populous municipalities such as, particularly, the City of Toronto, but also Mississauga and other CSDs in excess of 100,000 people (see Table 1 and the point configurations on Figure 2, 3 and 4). However, other important, but more subtle, differences are detectable. For instance, of the 306 acupuncture offices in metropolitan Toronto, the City of Toronto contains 60.46% of the cases and the addition of Mississauga, Brampton, Markham and Vaughan brings the proportion to 83%. Dentist office percentages are not as high for the City of Toronto (54.49%), but when the five municipalities, with more 200,000 in population, are combined, the percentage is similar (81.64%). In contrast, the chiropractor/naturopath category in the City of Toronto and the top five most populated municipality proportions are lower by comparison (49.85% and 74.02% respectively). Although general correspondence between office frequencies and CSD population is apparent, the same is not true of population change. For example, only modest office tallies occur in some of the less populated yet fast growing CSDs (such as Whitchurch-Stouffville, Bradford-West Gwillimbury and Milton) and a disproportionately high number of office points occur in Toronto and Mississauga in spite of below average population growth in these municipalities. Perhaps a stronger association between health care office numbers and population change will emerge in time and larger municipalities with very high growth rates, such as Brampton, Vaughan, Ajax and Milton, may be particularly worthy of investigation in the future.

As shown on the maps, considerable portions of metropolitan Toronto have few office points and other parts show quite high densities. This suggests a concentrated pattern and the degree of 'clustering' varies with health care type. The nearest neighbor indices for acupuncture, chiropractor/naturopath and dentist health care types were 0.576, 0.509 and 0.349, respectively, and all were statistically significantly clustered at a confidence interval of 99%. Acupuncture offices are less clustered and this may seem counterintuitive given that there are large areas within the Toronto CMA completely void of primary acupuncture practitioners whereas the chiropractor/naturopath and dentist points appear to 'fill in' the maps to a greater extent. Yet, even in the south-central, where all three categories have considerable proportions, the distribution varies. Dentist offices almost continuously cover the City of Toronto and into adjacent Mississauga, southern parts of Vaughan, Richmond Hill and Markham.

Census subdivision (CSD)	Pop 2011	Acu.	Chi. or nat.	Den.	Pop change 2006-11 (%)
Toronto	2,615,060	185	497	1,603	4.5
Mississauga	713,443	33	108	340	6.7
Brampton	523,911	8	31	174	20.8

Census subdivision (CSD)	Pop 2011	Acu.	Chi. or nat.	Den.	Pop change 2006-11 (%)
Markham	301,709	17	47	133	15.3
Vaughan	288,301	11	55	152	20.7
Richmond Hill	185,541	19	42	98	14.0
Oakville	182,520	7	51	110	10.2
Ajax	109,600	6	15	43	21.6
Pickering	88,721	3	14	38	1.0
Milton	84,362	3	19	40	56.5
Newmarket	79,978	7	30	51	7.6
Caledon	59,460	1	9	19	4.2
Halton Hills	59,008	2	13	26	6.7
Aurora	53,203	0	16	36	11.7
Georgina	43,517	1	6	11	2.8
Whitchurch-Stouffville	37,628	0	5	13	54.3
New Tecumseth	30,234	0	11	12	9.1
Bradford–West Gwillimbury	28,077	0	3	11	16.8
Orangeville	27,975	1	8	14	3.9
East Gwillimbury	22,473	0	4	3	6.7
Uxbridge	20,623	1	5	10	7.6
King	19,899	1	6	5	2.1
Mono	7,546	0	2	0	6.7
Chippewas of Georgina	275	0	0	0	-22.1
Toronto CMA	5,583,064	306	997	2,942	9.2

Table 1. Acupuncture, chiropractor/naturopath and dentist offices, population and population change for municipalities of metropolitan Toronto

http://dx.doi.org/10.5772/54599

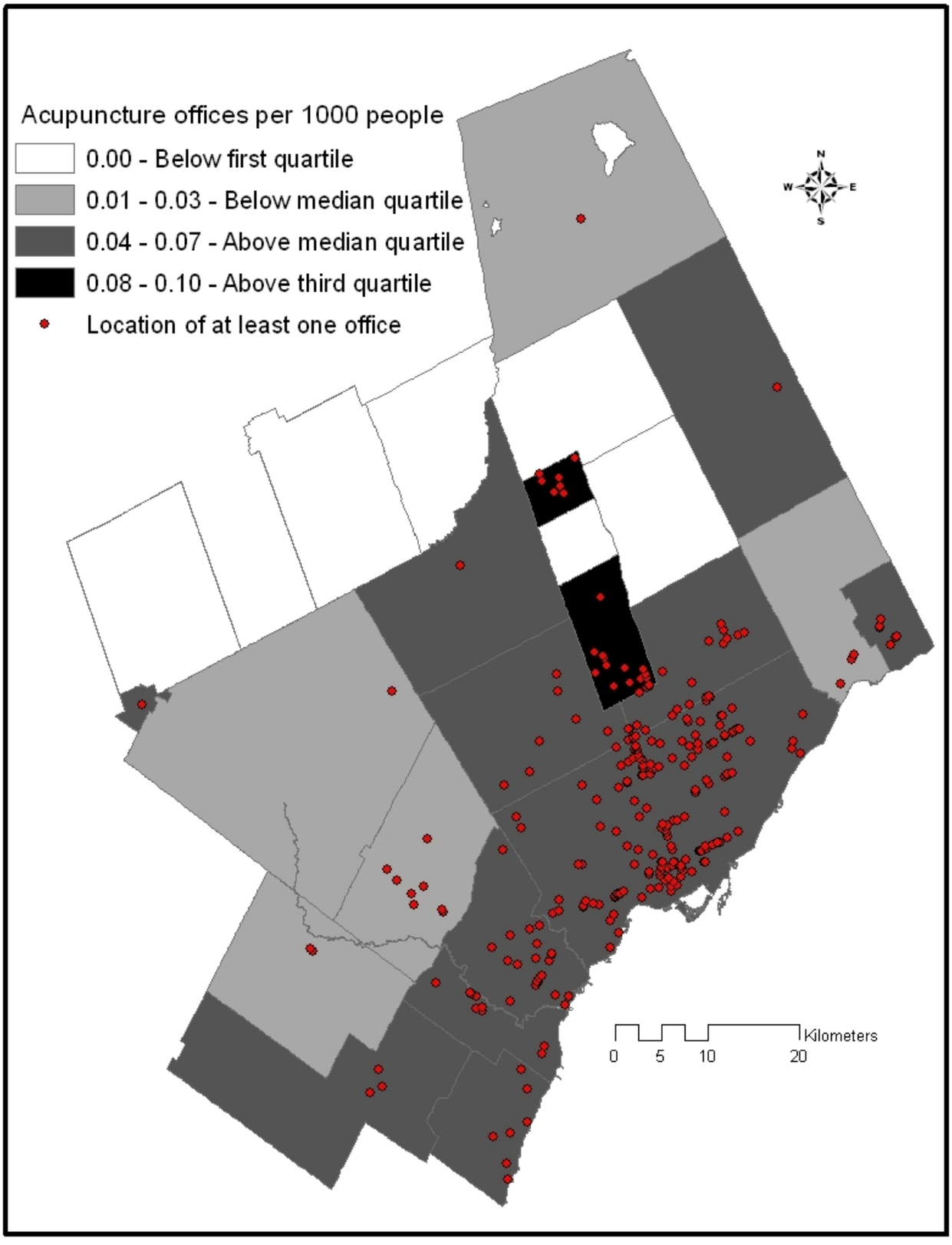

Figure 2. Location of acupuncture offices and acupuncture offices per 1000 people for municipalities in metropolitan Toronto

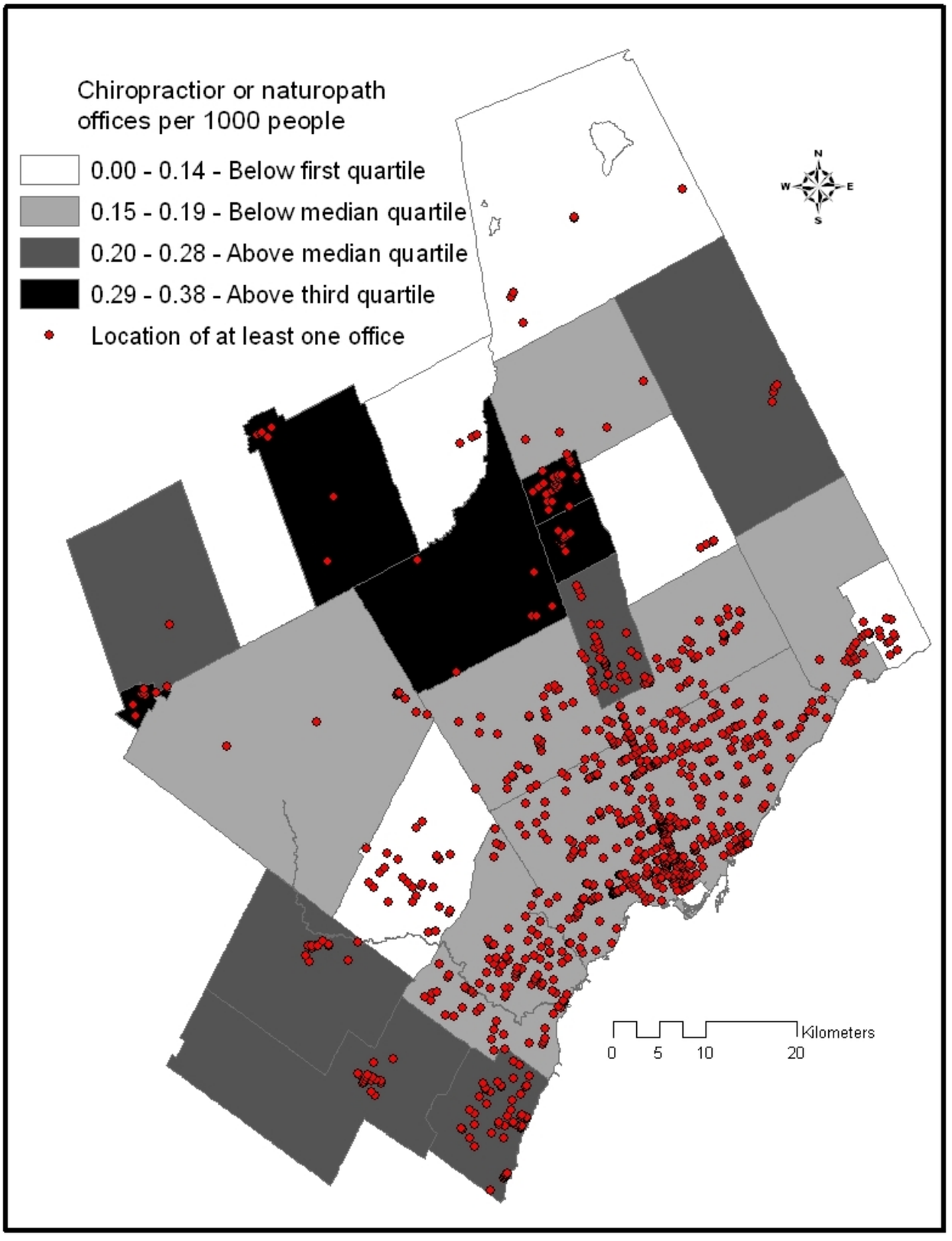

Figure 3. Location of chiropractor or naturopath offices and chiropractor or naturopath offices per 1000 people for municipalities in metropolitan Toronto

http://dx.doi.org/10.5772/54599

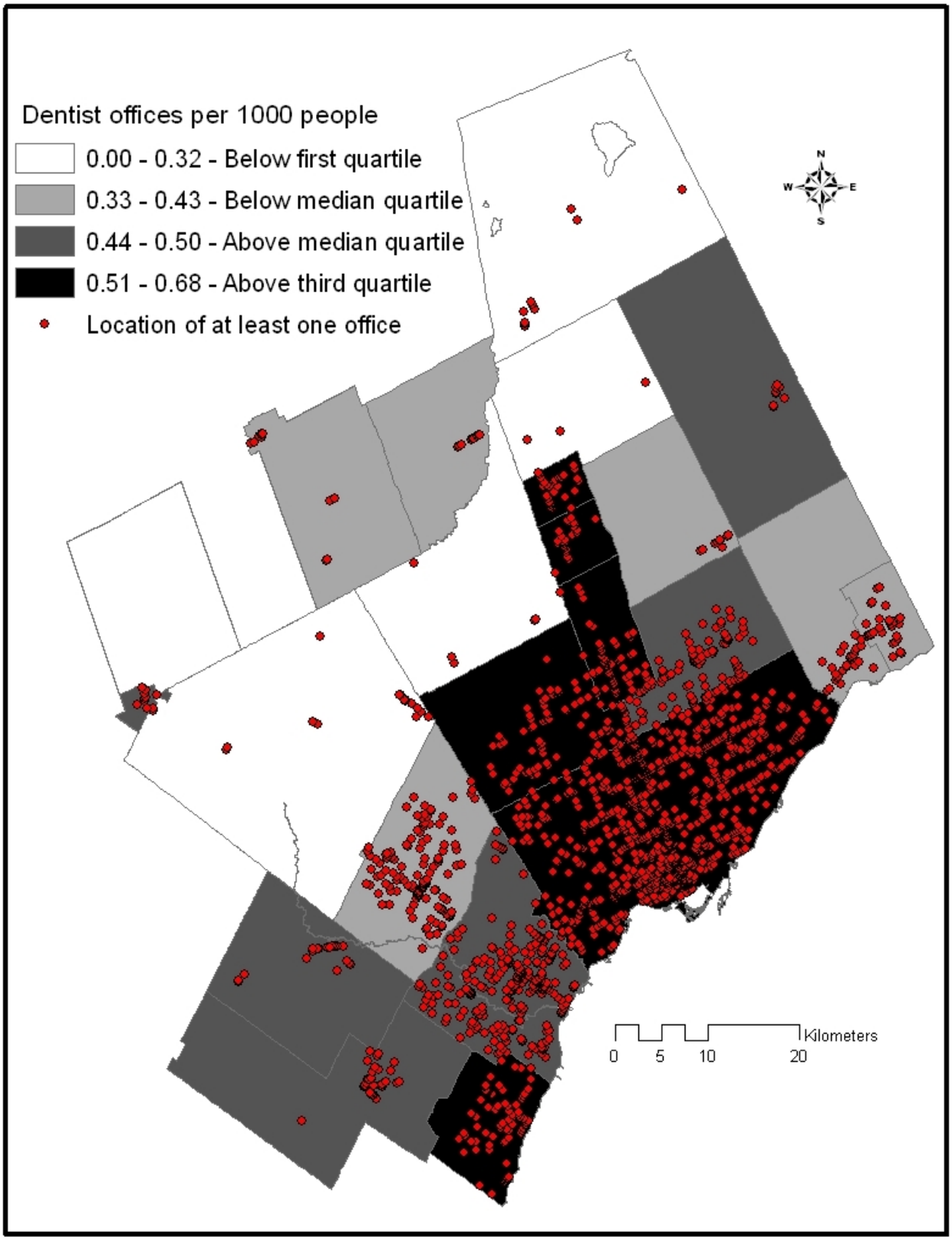

Figure 4. Location of dentist offices and dentist offices per 1000 people for municipalities in metropolitan Toronto

Southern Oakville and central Brampton are also substantially covered, which is certainly pushing the nearest neighbor index downward (more clustered). On the other hand, the chiropractor/naturopath and acupuncture categories show high concentrations in the southern municipalities as well, but the point patterns tend to be less regular and more prone to 'peaks and valleys' over space; moving the index towards random (1.00) by comparison. Subtle differences aside, all three health care point distributions are certainly not even close to 'dispersed'. A dispersed pattern would indicate more equal allocation throughout the study area. Thus, the clustered patterns illustrated on the maps and measured by the nearest neighbor analysis imply that patients/customers proximity to these offices varies by municipality.

By standardizing office tallies by population and the maps by quartile classification, the relative presence and absence of the three health care categories can be more plainly observed (see the polygons on Figures 2, 3 and 4). Acupuncture offices per 1,000 people, with values above the median quartile, show a spatially continuous pattern throughout the south-central and include the 'non-connected' municipalities of Orangeville, Uxbridge and Ajax. While several of these municipalities display relative presence, only two (Richmond Hill and Newmarket) are in the upper quartile. The spatial pattern of dentist offices per capita (Figure 4) is similar to the acupuncture office display, but with a greater number of CSDs in the upper quartile (the City of Toronto, Vaughan, Aurora and Oakville) and a comparatively more pronounced southwestern presence. In the case of both the acupuncture and dentist maps, the northern portions of most of the Toronto CMA exhibit below median offices per capita values and this suggests that dentists and acupuncture practitioners, in general, do not favor these areas. The chiropractor/naturopath map provides interesting contrast and is almost a 'negative mirror image' of the other two patterns. Only the relative importance of the extreme southwest, Newmarket, Richmond Hill, Uxbridge and Orangeville are common to all three health care types. Perhaps most striking is that most of southern metropolitan Toronto (including the City of Toronto) is below the median quartile for chiropractors and/or naturopaths in per capita terms. Conversely, northern CSDs such as King, New Tecumseth and Mono uniquely emphasize the chiropractor/naturopath classification.

Although the sheer numbers of offices and degree of clustering differ substantially, the office per capita spatial patterns for acupuncture practitioners and dentists are quite similar while the chiropractor/naturopath category more unique. It is intriguing that this spatial congruency between primary acupuncture practitioners and dentists occurs even though the former is most commonly associated with the CAM sector and the latter usually viewed as 'conventional' medicine. That chiropractors and/or naturopaths emphasize several areas not comparatively abundant in primary acupuncture practitioners or dentists (such as the northern parts of the metropolis) may suggest a 'substitution' situation; as chiropractors and naturopaths are likely to offer acupuncture services. As such, the maps may be indicating that areas within the Toronto CMA not comparatively rich in primary acupuncture practitioners per capita may still receive acupuncture and related therapies from other CAM providers, such as chiropractors and naturopaths. The geographic sameness of dentists and primary acupuncture offices per person does not necessarily indicate market overlap. These would be 'imperfect substitutes' in most cases, as dentists offering acupuncture are likely to do so in a more focused fashion, rather than

http://dx.doi.org/10.5772/54599

'full body' treatment options common to primary acupuncture specialists. Thus, there are some areas of metropolitan Toronto that display relatively high per capita values for all three types of health care, such as the extreme west, and other regions present more distinct health care biases. Yet, many of these overall trends do vary with office visibility characteristics.

4. Focusing on visibility tendencies

It is far more common for offices to be in high visibility areas, compared to low visibility areas, and the proportions of offices in high visibility areas are reasonably similar for the health care types: 76.47%, 76.03% and 80.86% for acupuncture, chiropractor/naturopath and dentist, correspondingly. Whereas, visibility approach varies much more by type; proportions in the high category are: 22.55% (acupuncture), 53.56% (chiropractor/naturopath) and 39.39% (dentist). Other complexities emerge when visibility area and visibility approaches are cross-compared (see Tables 2 and 3).

Health care type and visibility characteristics	# of offices	Average sales ($)	Average employment
Acupuncture			
High visibility area with a high visibility approach	51	555,392.16	4.37
High visibility area with a low visibility approach	183	480,692.13	2.92
Low visibility area with a high visibility approach	18	425,222.22	3.28
Low visibility area with a low visibility approach	54	487,113.21	3.06
All acupuncture offices	306	492,076.67	3.22
Chiropractor/naturopath			
High visibility area with a high visibility approach	409	770,668.30	4.65
High visibility area with a low visibility approach	349	786,870.69	4.65
Low visibility area with a high visibility approach	125	766,864.00	4.69
Low visibility area with a low visibility approach	114	684,000.00	3.68
All chiropractor/naturopath offices	997	766,150.75	4.55
Dentist			
High visibility area with a high visibility approach	930	1,434,896.77	7.44
High visibility area with a low visibility approach	1,449	1,054,632.85	5.40
Low visibility area with a high visibility approach	229	1,400,676.83	7.34
Low visibility area with a low visibility approach	328	1,003,161.59	5.11
All dentist offices	2,942	1,195,570.70	6.16

Table 2. Health care type and visibility characteristics in metropolitan Toronto compared by number of offices, average sales and average employment estimates

4.1. The 'high visibility area with a high visibility approach' group

Offices located in high visibility areas (along major roads and/or near or within commercial blocks) and employing a high visibility approach (above average advertising to sales ratio and/or a display ad in the yellow pages) tend to be the largest operations and/or the most 'successful'. Sales and employment values are the highest (acupuncture and dentist) or at least above average (chiropractors/naturopaths) in each of the groupings. Given that there is comparatively high cost involved in simultaneously pursuing above average advertising and maintaining a high traffic location, it is perhaps not surprising that more modestly-sized offices would choose, or be forced into, a different visibility approach.

The high visibility area/approach subset does show variability by health care type in terms of proportional location preferences. As shown on Table 3, acupuncture offices in this category are far less likely to be in the core of metropolitan Toronto (the City of Toronto) in comparison to chiropractors/naturopaths and dentists. Given that acupuncture offices are much smaller, the higher rents of these highly visible areas of Toronto (in addition to the costs associated with above average advertising) may dampen their numbers in these locations. High visibility area/approach acupuncture practitioners more frequently practice in the inner band (Mississauga, Brampton, Vaughan, Markham and Pickering) and the outer band (the remaining municipalities) areas. In contrast, more than 40% of chiropractors/naturopaths and dentists choose the City of Toronto. The nearest neighbor indices indicate significant clustering, but acupuncture practitioners are comparably the least concentrated: 0.639 (acupuncture), 0.572 (dentist) and 0.449 (chiropractor/naturopath). Since chiropractors/naturopaths and dentists emphasize the high visibility 'core' areas more than the acupuncture category, it is predictable that these nearest neighbor values would be further away from random (1.00).

Offices in this category are utilizing what might be termed the optimal visibility strategy. It is illuminating that it is only with chiropractor and/or naturopaths in which this visibility type is most frequent. Perhaps this implies that chiropractors and/or naturopaths are in more competitive markets compared to dentists and primary acupuncture practitioners. This may also point to strong business acumen. It is not uncommon for students in chiropractic and naturopathic schools to be exposed to small business workshops in which the attributes of being 'visible' are predictably illustrated.

4.2. The 'high visibility area with a low visibility approach' group

Almost 60% of acupuncture offices (59.80%) and a sizable proportion of dentists (49.25%), chiropractors and/or naturopaths (35.01%) fall into this category making it the overall most common visibility outcome. These are offices that locate in high traffic areas, but pursue comparatively less aggressive advertising approaches and tend to be in the intermediate to high range in sales and employment. Strikingly, this visibility group clearly favors the core; almost three-quarters of acupuncture offices and two-thirds of chiropractors/naturopaths and dentists are in the City of Toronto. The configuration of points are the most clustered of any other visibility designation for acupuncture and dentist (with nearest neighbor index values of 0.557 and 0.349, respectively) and comparatively concentrated for chiropractor/naturopath (0.557).

http://dx.doi.org/10.5772/54599

Health care type and visibility characteristics	Core	Inner band	Outer band
Acupuncture			
High visibility area with a high visibility approach	21.57	47.06	31.37
High visibility area with a low visibility approach	74.86	15.85	9.30
Low visibility area with a high visibility approach	22.22	38.89	38.89
Low visibility area with a low visibility approach	61.11	22.22	16.67
All acupuncture offices	60.46	23.53	16.01
Chiropractor/naturopath			
High visibility area with a high visibility approach	42.78	27.38	29.83
High visibility area with a low visibility approach	63.04	21.78	15.19
Low visibility area with a high visibility approach	38.40	28.80	32.80
Low visibility area with a low visibility approach	47.37	27.19	25.44
All chiropractor/naturopath offices	49.85	25.58	24.57
Dentist			
High visibility area with a high visibility approach	44.52	32.15	23.33
High visibility area with a low visibility approach	65.08	23.33	11.59
Low visibility area with a high visibility approach	32.75	37.12	30.13
Low visibility area with a low visibility approach	50.61	34.76	14.63
All dentist offices	54.49	28.45	17.06
Offices of all three types	53.83	27.42	18.75

Note: The 'core' area is the City of Toronto; the 'inner band' is comprised of Mississauga, Brampton, Vaughan, Markham and Pickering; the 'outer band' is the remaining municipalities.

Table 3. Health care type and visibility characteristics compared by 'core', 'inner band' and 'outer band' municipalities in metropolitan Toronto (shown in percentage)

Why does this visibility classification occur so frequently? Certainly this relates to the modest size of most of these offices, with acupuncture practitioner locations being the smallest. There might be limited funds available for advertising; and being 'clustered' in a high visibility location, and disproportionately in the high population density environment of the City of Toronto, might be necessary in these competitive markets. In effect, these are offices that have chosen a location with high traffic volume over 'eye catching' advertising in the yellow pages or websites. A key influence on this group is being proximate to vehicle and/or pedestrian traffic flow. This may also explain why so few offices of this visibility group are in the outer band of municipalities of metropolitan Toronto, where traffic volume opportunities would be comparatively reduced.

4.3. The 'low visibility area with a high visibility approach' group

This visibility group is rare, in terms of office frequency, and the point configurations are less clustered and distributed quite evenly across the Toronto CMA. The acupuncture and dentist classes have the lowest number of office tallies of any visibility group (5.88% and 7.78%, correspondingly) and chiropractors/naturopaths (12.54%) are below average. The nearest neighbor indices are well above the norm for each respective health care type: 0.811 compared to 0.576 for acupuncture, 0.792 vis-à-vis 0.509 for the chiropractor/naturopath category and 0.551 compared to 0.493 for dentists. In fact, the nearest neighbor index for acupuncture (0.811) was statistically insignificance (with 99% confidence) and thus random. The comparatively even distribution across the core, inner band and outer band spatial divisions echo the nearest neighbour results. Notice that the proportions all stay within the 20-40% range for each health care type (see Table 3); a result that does not occur for any other visibility group. This evenness is complemented with the highest proportions in the outer band; again, for all three health care categories.

The rareness of this visibility group is perhaps surprising. One might assume that if an office was not in a high volume location, it would have to compensate for this lack of physical visibility with virtual visibility, through ads in the yellow pages, websites and other creative means of promotion. Yet, the results show that if this strategy is being employed, it does not occur very often.

4.4. The 'low visibility area with a low visibility approach' group

This group is, for all intents and purposes, the most disadvantaged in terms of visibility; and is described as offices in low traffic areas with relatively limited propensity to advertise. This group is quite regularly found in the core (ranging from 47.37% to 61.11%) and is definitely below average in size. While more clustered than the 'low visibility area with a high visibility approach' assembly of points, these offices tend to be more spread out than the two 'high visibility area' groups. The nearest neighbor indices for this visibility group provide confirmation: acupuncture 0.790, chiropractor/naturopath 0.636 and dentist 0.493.

Given the small size (in terms of average sales and employment), limited advertising and propensity to be away from high volume areas, one might expect that many of these health care providers have their business and residence at the same address. If the lack of 'formal' advertising is by choice, perhaps this visibility type can also be described as professionals who rely chiefly on 'word of mouth' to capture new customers.

5. Conclusions and implications for acupuncture spatial accessibility

The visibility traits of health care providers that administer (or may administer) acupuncture services are complex. Nevertheless, this study did demonstrate that the visibility tendencies of various acupuncture treatment locations leave interesting and distinctive geographies and a greater appreciation of these patterns builds upon our knowledge regard-

http://dx.doi.org/10.5772/54599

ing the motivations and potential profitability of small health care business owners. The majority of primary acupuncture (PA), chiropractor/naturopath and dentist offices are attracted to high visibility/high volume areas and some of these employ high visibility/more aggressive advertising approaches to attract new patrons. Many practitioners are in high visibility locations, but eschew aggressive advertising and on occasion the reverse occurs (offices in low visibility areas but with a high visibility approach). The former constitutes the most frequent 'visibility' classification' and implies the importance of strategic site choices, in which being in a highly visible location may be replacing the need to advertise lavishly on websites and yellow pages. The latter category may have motivations that follow similar logic: because these offices have fewer geographic advantages, the approach to advertising and self-promotion needs to be more aggressive to compensate. There is also a significant minority of cases that are in low visibility areas and also forego high visibility (advertising) approaches. These may describe professionals who stay in business, and perchance are very profitable, primarily on the strength of a sterling reputation. It is possible that for this one very select group of health care professionals, geography and promotion are irrelevant as patients find them regardless.

Studying acupuncture treatment locations, in a wider sense, enhances our understanding of the complex reasons for spatial disparities in health care accessibility and potentially aids policymakers concerned with more adequately equating health care opportunities amongst all citizens within a jurisdiction. For instance, there is quite striking spatial imbalances of PA offices throughout the Toronto metropolitan area which deviate only slightly by visibility approach. Many communities and municipalities in Greater Toronto do not have local PA services and/or are below the median in terms of offices per capita. The general trend is that people most 'come south' to patronize these particular offices, but this is unlikely to accurately demonstrate true accessibility disadvantages in the more peripheral areas. Chiropractors and naturopaths display a far greater presence in Toronto's peripheral/northern municipalities; and if acupuncture services are offered by these chiropractors and naturopaths, then accessibility disadvantages across metropolitan Toronto may not be as acute. It is less likely that dentists are playing the same role; although the very specialized acupuncture procedures carried out in some dentist's offices may create partial overlap with PA services in some areas. Admittedly, it remains uncertain how clearly most people differentiate the acupuncture services rendered from naturopaths, chiropractors, dentists and primary acupuncturists. Thus, from a business competitiveness standpoint, it is also not certain if PA offices should vigorously promote differences in acupuncture technique from other providers. More precisely evaluating commonalities and distinctions should be investigated in the future by directing surveys to acupuncture professionals and their patients.

Given that CAM-based acupuncture procedures are not covered by the publicly-funded Ontario Health Insurance Plan (OHIP) and are rarely paid by private employers, the vast majority of people in the province purchase these services 'out of pocket' (although some cost can be recouped through income tax deductions). In this regard, primary acupuncturists, chiropractors and naturopaths are on relatively 'equal footing' in terms of vying for new customers; making factors such as spatial accessibility and advertising in conjunction with effectiveness (and perhaps uniqueness) of treatment and professional reputation potentially very important determinants in market share distribution. If primary acupuncturists seek to secure a greater presence in the periphery of the Toronto CMA, then two, not mutually ex-

clusive, approaches are logical. Either these practitioners must set up directly in these municipalities and/or they must advertise aggressively and perhaps highlight differences in their treatment effectiveness from others. There is some evidence that the latter may be occurring. As demonstrated in this study, while PA establishments are low in numbers in the 'outer band' of the CMA, roughly one-third of these offices employ a high visibility approach in terms of advertising (31.37% and 38.89% for high and low visibility areas respectively) and these proportions are higher than both dentists and chiropractors/naturopaths in these peripheral areas.

While greater attention to advertising by PA specialists, such as the presently under-utilized construction of informative websites, may encourage greater commuting to treatment, it will not completely offset spatial accessibility disparities. Not everyone is willing to absorb both treatment and significant transportation (monetary and time) costs; meaning that accessibility disadvantages to primary acupuncturists must also be countered through a wider distribution of these offices throughout metropolitan Toronto. The faster growing municipalities of the outer band such as Milton, Oakville, Bradford-West Gwillimbury, Aurora, Whitchurch-Stouffville, and Ajax might be areas of particular opportunity and perhaps strong candidates for 'greenfield' PA office development. Successfully widening the allocation of PA offices would also be dependent on counteracting apparent cultural influences as there are presently dense settlements of PA offices in pockets of Toronto with high proportions of people of Chinese ethnic origins [29].

Certainly, spatial accessibility to acupuncture treatment is enhanced by greater integration between the complementary and alternative and conventional medical sectors. While institutional and attitudinal divisions have historically been considerable, particularly in some western countries, integration is occurring even if the magnitude of medical assimilation does vary by jurisdiction. If more professionals in conventional medicine become receptive to non-allopathic approaches, spatial accessibility to acupuncture and other CAM approaches is improved in at least two ways. First, the number of locations from where acupuncture procedures and referrals are made expands considerably as more conventional health care offices, which are often in places of high visibility, are included in the mix. Second, medical procedures are far more likely to be listed under public health care insurance programs and/or given personal income tax advantages with allopathic doctor involvement. If greater integration encourages policymakers to extend full or partial coverage, acupuncture treatment accessibility would be improved as it becomes more affordable to a wider population.

Author details

Stephen P. Meyer

Address all correspondence to: smeyer@laurentian.ca

Department of Geography, Laurentian University, Ramsey Lake Road, Greater Sudbury, Ontario, Canada

http://dx.doi.org/10.5772/54599

References

[1] Rosted, P, Buudgaard, M, & Gordon, S. Pedersen AML. Acupuncture in the Management of Anxiety Related to Dental Treatment: A Case Series. Acupuncture in Medicine (2010). 1759-9873, 28(1), 3-5.

[2] Rosted, P, & Carrotte, P. An Audit to Assess the Outcome of a 1-Day Acupuncture Course for Dentists. European Journal of Dental Education (2007). 1600-0579, 11(1), 23-28.

[3] Eitner, S, Wichmann, M, & Holst, S. Hypnopuncture''- Dental-Emergency Treatment Concept for Patients with a Distinctive Gag Reflex. Journal of Clinical and Experimental Hypnosis (2005). 0020-7144, 53(1), 60-73.

[4] CAMlineCAM Therapies and Practitioners- Acupuncture. http://www.camline.ca/ accessed 13 April 13 (2012).

[5] Buchmueller, T. C, Jacobson, M, & Wold, C. How Far to the Hospital? The Effect of Hospital Closures on Access to Care. Journal of Health Economics (2006). 0167-6296, 25(4), 740-761.

[6] Langford, M, & Higgs, G. Measuring Potential Access to Primary Healthcare Services: The Influence of Alternative Spatial Representations of Population. The Professional Geographer (2006). 1467-9272, 58(3), 294-306.

[7] Meyer, S. P. A Geographic Assessment of 'Total' Health Care Supply in Ontario: Complementary and Alternative Medicine and Conventional Medicine. The Canadian Geographer (2010). 1541-0064, 54(1), 104-122.

[8] Meyer, S. P. Comparing Spatial Accessibility to Conventional Medicine and Complementary and Alternative Medicine in Ontario, Canada. Health & Place (2012). 1353-8292, 18(2), 305-314.

[9] Monnet, E, Collin-naudet, E, Bresson-hadni, S, & Minello, A. Di Martino V, Carel D, Jooste V, Cagnaire A, Evrard P, Obert-Clerc B, Miguet JP, Hillon P. Place of Residence and Distance to Medical Care Influence the Diagnosis of Hepatitis C: A Population-Based Study. Journal of Hepatology (2006). 1527-3350, 44(3), 499-506.

[10] Pong, R. W, & Pitblado, J. R. Geographic Distribution of Physicians in Canada: Beyond How Many and Where. Ottawa: Canadian Institute for Health Information; (2005).

[11] Pong, R. W. DesMeules M, Heng D, Lagacé C, Guernsey JR, Kazanjian A, Manuel D, Pitblado JR, Bollman R, Koren I, Dressler MP, Wang F, Luo W. Patterns of Health Services Utilization in Rural Canada. Chronic Diseases and Injuries in Canada (2011). 2204-7772, 31(1), 1-36.

[12] Rosenthal, M. B, Zaslavsky, A, & Newhouse, J. P. The Geographic Distribution of Physicians Revised. Health Services Research (2005). 1475-6773, 40(6), 1931-1952.

[13] Schuurman, N, Berube, M, & Crooks, V. A. Measuring Potential Spatial Access to Primary Health Care Physicians Using a Modified Gravity Model. The Canadian Geographer (2010). 1541-0064, 54(1), 29-45.

[14] Andrews, G. J, Wiles, J, & Miller, K. L. The Geography of Complementary Medicine: Perspectives and Prospects. Complementary Therapies in Nursing & Midwifery (2004). 1353-6117, 10(3), 175-185.

[15] Andrews, G. J, & Boon, H. CAM in Canada: Places, Practices, Research. Complementary Therapies in Clinical Practice (2005). 1744-3881, 11(1), 21-27.

[16] Hollenberg, D, & Bourgeault, I. New Health Geographies of Complementary, Alternative and Traditional Medicines in Primary Health Care. In: Crooks VA, Andrews GJ (eds.) Primary Health Care: People, Practice, Place. Surrey: Ashgate; (2009). 978-0-75467-247-0, 167-182.

[17] Meyer, S. P. The Spatial Pattern of Complementary and Alternative Medical Offices across Ontario and within Intermediate-Sized Metropolitan Areas. Urban Geography (2008). 0272-3638, 29(7), 662-682.

[18] Meyer, S. P. Place-Specific Explanations for the Geographic Patterns of Complementary and Alternative Practitioners: Contrasting Chiropractor, Massage, Holistic, Acupuncture, Naturopathic and Homeopathic Operations in Ontario. International Journal of Business and Social Science (2012). 2219-1933, 3(8), 24-39.

[19] Albert, D. P. New York and Colorado as Critical States in the Diffusion of State Licensing of Naturopathic Physicians. Complementary Health Practice Review (2009). 1533-2101, 14(2), 59-69.

[20] Albert, D. P, & Butar, F. B. Distribution, Concentration and Health Care Implications of Naturopathic Physicians in the United States. Complementary Health Practice Review (2004). 1076-1675, 9(2), 103-117.

[21] Albert, D. P, & Butar, F. B. Diffusion of Naturopathic State Licensing in the United States and Canada. Complementary Health Practice Review (2004). 1076-1675, 9(3), 193-207.

[22] Alcantara, J, Ohm, J, & Kunz, D. The Chiropractic Care of Children. The Journal of Alternative and Complementary Medicine (2010). 1075-5535, 16(6), 621-626.

[23] Brindle, M, & Goodrick, E. Revisiting Maverick Medical Sects: The Role of Identity in Comparing Homeopaths and Chiropractors. Journal of Social History (2001). 1527-1897, 34(3), 569-589.

[24] Smith, M, & Carber, L. Chiropractic Health Care in Health Professional Shortage Areas in the United States. American Journal of Public Health (2002). 0090-0036, 92(12), 2001-2009.

[25] Waalen, J. K, & Mior, S. A. Practice Patterns of 692 Ontario Chiropractors ((2001). Journal of Canadian Chiropractors Association 2005;0008-3194, 49(1), 21-31.

[26] Williams, A. M. The Diffusion of Alternative Health Care: A Canadian Case Study of Chiropractic and Naturopathic Practices. The Canadian Geographer (2000). 1541-0064, 44(2), 152-166.

[27] Li, H. Y, Cui, L, Cui, M, & Tong, Y. Y. Active Research Fields of Acupuncture Research: A Document Co-Citation Clustering Analysis of Acupuncture Literature. Alternative Therapies in Health and Medicine (2010). 5571-4960, 16(6), 38-45.

[28] Bishop, F, Massey, Y, Yardley, L, & Lewith, G. How Patients Choose Acupuncturists: A Mixed-Methods Project. Journal of Alternative & Complementary Medicine (2011). 1075-5535, 17(1), 19-25.

[29] Meyer, S. P. A Spatial Analysis of Acupuncture Practitioners in Ontario, Canada: Assessing Regional and Intra-Metropolitan Trends. In: Saad M. (ed.) Acupuncture Concepts and Physiology. Rijeka: InTech; (2011). 978-9-53307-410-8, 189-206.

[30] Thompson, J. B. The New Visibility. Theory, Culture & Society (2005). 0263-2764, 35.

[31] InfoCanadaCanadian Business Directory, April (2012). edition. Mississauga: InfoCanada; 2012.

[32] Statistics CanadaRoad Network File, (2011). Census. http://www12.statcan.gc.ca/census-recensement/2011/geo/RNF-FRR/index-eng.cfmaccessed 12 June 2012)

[33] DMTI Spatial IncLand Use (LUR). http://geo2.scholarsportal.info/accessed 15 May (2012).

[34] Ebdon, D. Statistics in Geography. New York: Basil Blackwell; (1987). 0-63113-688-6

[35] Statistics CanadaBoundary Files, (2011). Census. http://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-eng.cfmaccessed 1 June 2012).

[36] Statistics CanadaPopulation and Dwelling Count Highlight Tables, (2011). Census. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Tables-Tableaux.cfm?LANG=Eng&T=300accessed 1 June 2012).

IntechOpen